Wisconsin Millipeds: A Preliminary Species List and a Catalog of Records

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The milliped fauna of Wisconsin remains poorly known. No comprehensive surveys have been completed, and records of Wisconsin millipeds are scattered throughout the taxonomic literature. No one has previously attempted to catalog the state's species.

The following preliminary list and catalog of 26 species, representing 13 families in six orders, was compiled after an extensive review of milliped literature and examination of specimens from various museum collections. This is a preliminary working list; field work and additional literature review will likely add species to it. It is intended to consolidate records and stimulate interest in this often overlooked group.

All known published Wisconsin records are included in the catalog. Examination of specimens in several museum collections provided many records, however, not every specimen included in the catalog was examined by the author. Collection inventory lists provided by museum staff and research notes provided by Dr. R.M. Shelley, North Carolina State Museum of Natural Science, yielded many additional records. Records from 1890 through 1994 are included, and 10 additional species are listed as potentially occurring in the state. Detailed collection information for all cited specimens is available from the author.

Systematic arrangement follows that of Hoffman (1980), subsequently adopted by Shelley (1988) and Hoffman (1990), with taxa listed alphabetically under the appropriate family and genus. Records for each species are presented in chronological order. Each record consists of three parts: year of collection or publication, the name of the county where the collection occurred (or "Wisconsin" when the county is not known or provided), and the name of the museum collection in which the specimen is maintained and/or a literature citation.

For example:

Polyzonium mutabile Causey:
1977: Sheboygan: TMM
1983: Wisconsin: Kevan 1983

There are two records for *Polyzonium mutabile* in Wisconsin. A specimen collected in Sheboygan County in 1977, is maintained in the Texas Memorial Museum collection; and Kevan (1983) listed *P. mutabile* from Wisconsin, but did not specify a locality.

The following abbreviations are used for the various museum collections: AMNH: American Museum of Natural History, New York, NY; FMNH: Field Museum of Natural History, Chicago, IL; FSCA: Florida State Collection of Arthropods, Gainesville, FL; ILNHS: Illinois Natural History Survey, Urbana, IL; MCZ: Museum of Comparative Zoology, Harvard University, Cambridge, MA; MPM: Milwaukee Public Museum, Milwaukee, WI; NCSM: North Carolina State Museum of Natural Science, Raliegh, NC; NMNH: National Museum of Natural History, Smithsonian Institution, Washington DC; TMM: Texas Memorial Museum, University of Texas, Austin, TX .

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SHOUT
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Class Diplopoda
Sub Class Helminthomorpha
Order Polyzoniida

Family Polyzoniidae

Polyzonium sp. Brandt
1955: Oneida: ILNHS

Polyzonium mutabile Causey
1977: Sheboygan: TMM
1983: Wisconsin: Kevan 1983

Order Spirobolida

Family Spirobolidae

Narceus americanus annularis (Rafinesque)
1897, prior to: Milwaukee: MPM
1915: Dane: Cahn 1915
1926: Vernon: MPM
1946: Clark: FMNH, Keeton 1960
1946: Sauk: Keeton 1960
1948: Sauk: Keeton 1960
1950: Sauk: ILNHS
1951: Upper Mississippi Valley: Hoffman 1951
1973: Grant: TMM
1983: Wisconsin: Kevan 1983
1992: Brown: MPM
1992: Door: MPM
1992: Ozaukee: MPM
1994: Crawford: MPM

Order Julida

Family Blaniulidae

Blaniulids unidentifiable to species level
1978: Milwaukee: MPM

Nopoiulus kochii (Gervais)
1953: Dane: FSCA
1953: Dane: FSCA
1957: Crawford: NMNH
1976: Milwaukee: MPM
1979: Ozaukee: MPM
1983: Wisconsin: Kevan 1983

Family Parajulidae

Parajulids unidentifiable to species level
1977: Milwaukee: MPM
1977: Waukesha: MPM
1980: Waukesha: MPM
1982: Douglas: MPM
1982: Douglas: MPM
1982: Vilas: MPM
1984: Milwaukee: MPM

Aniulus bollmani Causey
1952: Wisconsin: Causey 1952
1958: Wisconsin: Chamberlin & Hoffman 1958
1983: Wisconsin: Kevan 1983

Oriulus medianus Chamberlin
1982: Vilas: MPM

Ptyoiulus sp. Cook
1977: Milwaukee: MPM
1978: Door: MPM
1979: Washington: MPM

Uroblaniulus canadensis (Newport)
1951: Door: Causey 1952

Uroblaniulus stolidus Causey
1951: Door: AMNH, Causey 1952
1977: Dane: TMM
1977: Dane: TMM

Family Julidae

Julids unidentifiable to species level
1978: Milwaukee: MPM

Cylindroiulus sp. Verhoeff
1978: Milwaukee: MPM
1980: Milwaukee: MPM

Cylindroiulus caeruleocinctus (Wood)
1973: Dane: TMM
1975: Dane: TMM
1975: Dane: TMM
1976: Milwaukee: MPM
1976: Waukesha: MPM
1977: Milwaukee: MPM
1977: Sheboygan: TMM
1977: Waukesha: MPM
1978: Milwaukee: MPM
1978: Walworth: MPM
1980: Washington: MPM
1982: Washington: MPM
1983: Wisconsin: Kevan 1983

Ophyiulus pilosus (Newport)
1974: Dane: TMM
1976: Milwaukee: MPM
1977: Milwaukee: MPM
1977: Sheboygan: TMM
1978: Milwaukee: MPM
1978: Milwaukee: MPM
1978: Milwaukee: MPM
1979: Waukesha: MPM
1980: Milwaukee: MPM
1980: Washington: MPM
1980: Washington: MPM
1983: Wisconsin: Kevan 1983

Order Callipodida

Family Caspiopetalidae

Abacion tesselatum Rafinesque
1940: Walworth: FMNH, Shelley 1984
1949: Walworth: MCZ, Shelley 1984
1958: Wisconsin: Chamberlin & Hoffman 1958
1975: Crawford: NCSM
1978: Dane: TMM
1983: Wisconsin: Kevan 1983

Order Chordeumatida

Family Conotylidae

Achemenides pectinatus (Causey)
1958: Richland: FSCA
1972: caves and mines in the driftless area: Shear 1972
1983: Wisconsin: Kevan 1983
1988: Mississippi Valley of southern Wisconsin: Shelley 1988

Austrotyla specus (Loomis)
1961: Wisconsin: Causey 1961
1971: upper Mississippi Valley: Shear 1971
1972: southwestern Wisconsin: Shear 1972
1976: Grant: TMM

Family Trichopetalidae

Trichopetalum lunatum Harger
1967: Wisconsin: Causey 1967
1983: Wisconsin: Kevan 1983

Family Caseyidae

Underwoodia iuloides (Harger)
1953: Fond du Lac: FMNH, Shelley 1988
1993: eastern Wisconsin: Shelley 1993a

Order Polydesmida

Family Xystodesmidae

Apheloria virginiensis (Drury)
n.d.: Milwaukee: MPM

Pleuroloma flavipes Rafinesque
n.d.: Milwaukee: MPM, Shelley 1980
1890: some parts of Wisconsin: Wheeler 1890
1905: Milwaukee: AMNH, Shelley 1980
1905: Milwaukee: AMNH, Shelley 1980
1917: Waukesha: MPM
1932: Pepin: NMNH
1938: Walworth: FMNH
1946: Sauk: MCZ, Shelley 1980

Pleuroloma flavipes Rafinesque, cont.
1950: Crawford: MCZ, Shelley 1980
1958: Washburn: FSCA, Shelley 1980
1965: Dane: MCZ, Shelley 1980
1982: Green: MPM
1993: Ozaukee: MPM
1993: Ozaukee: NCSM

Semionellus placidus (Wood)
1983: Wisconsin: Kevan 1983
1990: Wisconsin: Shelley 1990

Family Platyrhacidae (Euryuridae)

Auturus evides (Bollman)
1914: Dane: NMNH
1926: Vernon: MPM, Shelley 1982
1931: Pepin: Shelley 1982
1949: Grant: MCZ, Shelley 1982
1949: Grant: MCZ, Shelley 1982
1949: Pierce: MCZ, Shelley 1982
1949: Vernon: MCZ, Shelley 1982
1949: Vernon: MCZ, Shelley 1982
1949: Vernon: MCZ, Shelley 1982
1949: Vernon: MCZ, Shelley 1982
1955: Sauk: MCZ, Shelley 1982
1955: Sauk: MCZ
1973: Grant: TMM
1973: Grant: TMM
1973: Grant: TMM
1975: Crawford: TMM
1975: Crawford: TMM
1975: Dane: TMM
1975: Trempeleau: TMM

Family Paradoxosomatidae

Oxidus gracilis (Koch)
1976: Washburn: TMM
1978: Milwaukee: MPM

Family Polydesmidae

Polydesmids unidentifiable to species level
1978: Milwaukee: MPM

Polydesmus sp. Latreille
1915: Dane: Cahn 1915

Polydesmus inconstans Latzel
1910: Marinette: NMNH
1954: Marathon: MCZ
1955: Dane: FSCA
1977: Waukesha: MPM
1979: Ozaukee: MPM
1979: Waukesha: MPM
1983: Wisconsin: Kevan 1983

Pseudopolydesmus serratus (Say)
n.d.: Waukesha: MPM
1911: Dane: NMNH
1955: Marquette: MCZ
1974: Crawford: TMM
1974: Ozaukee: TMM
1977: Racine: MPM
1980: Ozaukee: MPM
1980: Washington: MPM

Scytonotus granulatus (Say)
n.d.: Rock: MCZ, Shelley 1993b
n.d.: Rock: ILNHS, Shelley 1993b
1947: Walworth: MCZ, Shelley 1993b
1949: Washington: MCZ, Shelley 1993b
1952: Walworth: MCZ, Shelley 1993b
1954: Sheboygan: FSCA, Shelley 1993b
1955: Dane: MCZ, Shelley 1993b
1955: Sauk: MCZ, Shelley 1993b
1955: Sauk: MCZ, Shelley 1993b
1955: Sauk: MCZ, Shelley 1993b
1960: Adams: FSCA, Shelley 1993b
1962: Vernon: ILNHS, Shelley 1993b
1970: Richland: Shelley 1993b
1973: Richland: TMM, Shelley 1993b
1973: Grant: TMM, Shelley 1993b
1974: Ozaukee: TMM, Shelley 1993b
1974: Trempeleau: TMM, Shelley 1993b
1975: Crawford: TMM, Shelley 1993b
1975: Crawford: TMM, Shelley 1993b
1977: Fond du Lac: TMM, Shelley 1993b

POTENTIAL WISCONSIN SPECIES: The following ten species have been found in states adjacent to Wisconsin and based on what is known about habitat needs likely occur in Wisconsin as well.

Order Polyzoniida

Family Polyzoniidae
Polyzonium cryptocephalum (McNeill)

Order Julida

Family Blaniulidae
Nopoiulus minutus (Brandt)

Family Parajulidae
Aliulus rugosus (Bollman)
Aniulus paludicolens Causey
Hakiulus diversifrons (Wood)
Oriulus venustus (Wood)

Family Julidae
Cylindroiulus latistriatus latistriatus (Curtis)

Order Callipodida

Family Caspiopetalidae
Abacion texense (Loomis)

Order Polydesmida

Family Polydesmidae
Brachydesmus (Polydesmus) superus Latzel

Family Platyrhacidae
Euryurus leachii (Gray)

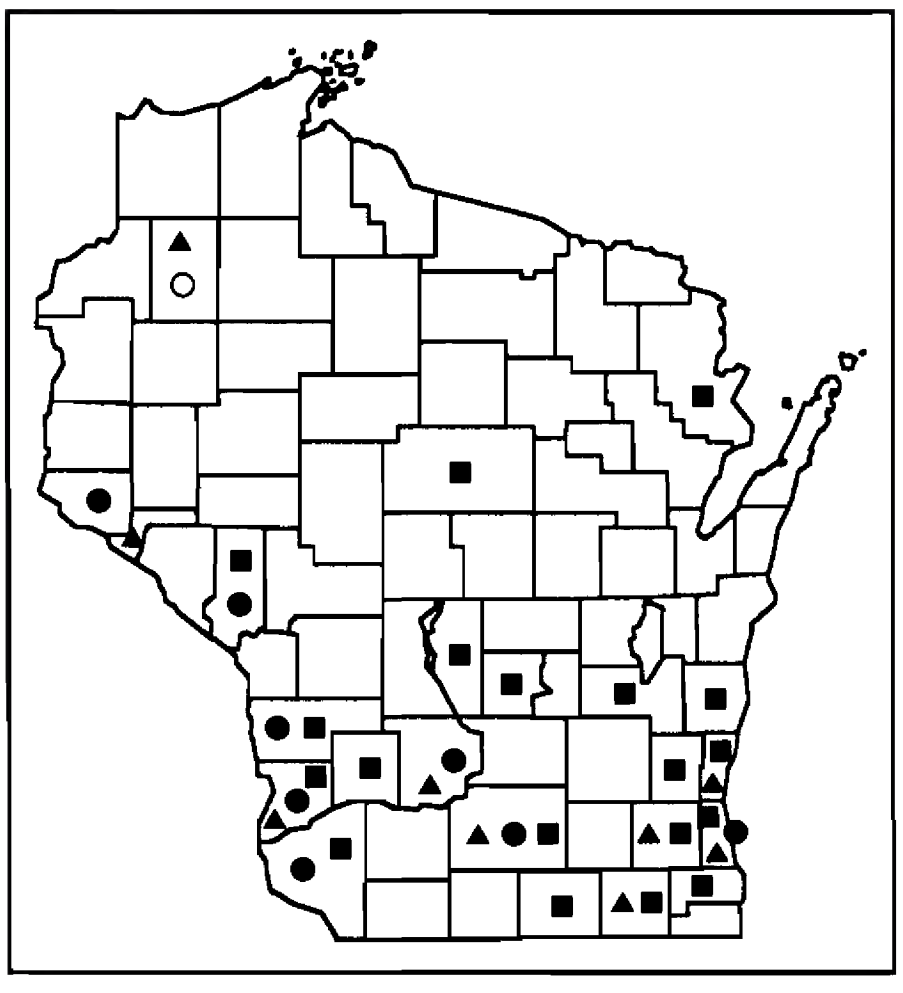

Figure 1. The distribution of Polydesmida in Wisconsin; ▲ = Xystodesmidae, ● = Platyrhacidae, ○ = Paradoxosomatidae, and ■ = Polydesmidae. Symbols are county records plotted at the center of each county.

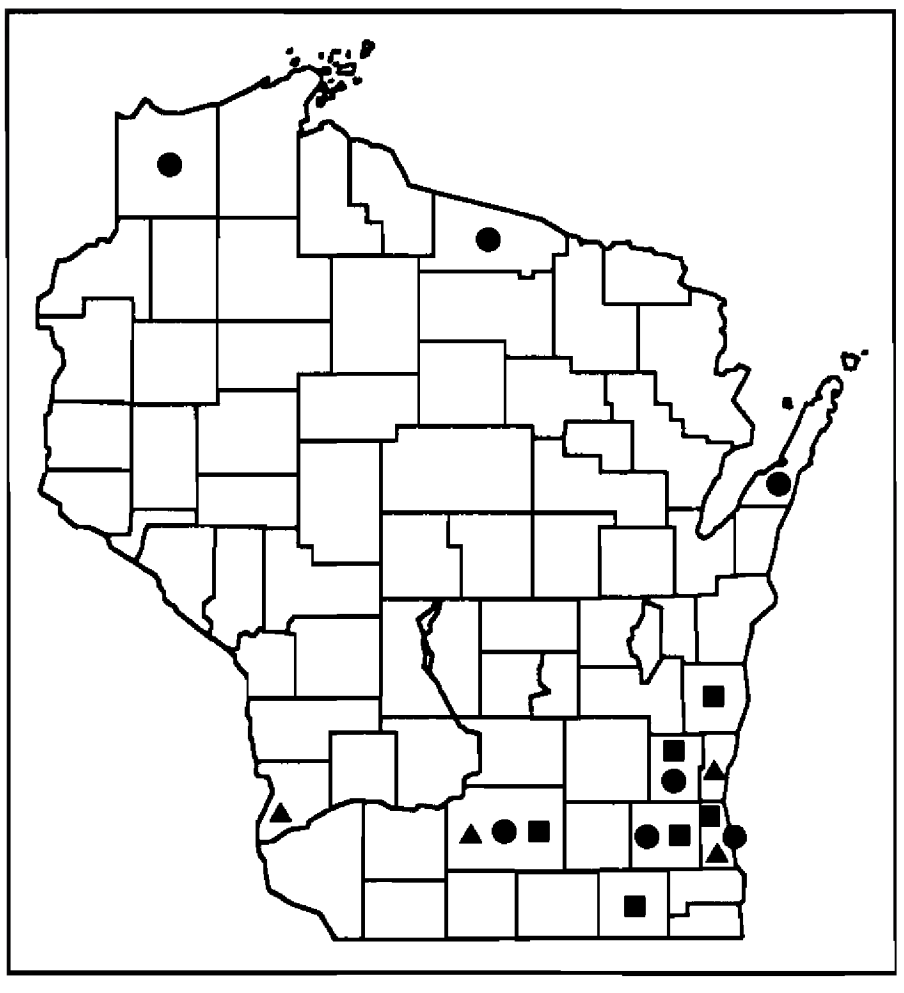

Figure 2. The distribution of Julida in Wisconsin; ▲ = Blaniulidae, ● = Parajulidae, ■ = Julidae. Symbols are county records plotted at the center of each county.

DISCUSSION: Milliped collecting in Wisconsin has consisted primarily of miscellaneous specimens taken by entomologists in the course of other studies. Relatively few collections have been made in the northern half of the state, and no area has been sampled intensively. As a result, patterns found in the current known distribution of millipeds may be artifacts of collecting, rather than reflections of ecological conditions or true distributions. For example, *Narceus americanus annularis* was known only from four southern Wisconsin counties prior to 1992. However, field work that year found the species in northern Door County more than 160 km from its previously known range (Watermolen 1995). Additional field work will probably show that this species is found in many other parts of the state as well.

The Order Polydesmida appears to be the most widely distributed order, with Polydesmids being collected in 20 counties, and Platyrhacids and Xystodesmids in eight counties each (Fig. 1). *Scytonotus granulatus*, known from 14 counties, appears to be the most widely distributed milliped. *Auturus evides* and *Pleuroloma flavipes* also appear to be wide ranging in the southern half of Wisconsin.

Apheloria is known from the northern 2/3 of eastern North America from a line extending from central New York through southern Ontario, southern Wisconsin, and northern Iowa south to central Arkansas, northern Alabama, and northern South Carolina (Shelley and Whitehead 1986). This genus is currently being revised (Shelley, pers. comm.), and *iowa* probably will not stand. The only specimen of *Apheloria* from the state is a very old specimen with uncertain collection data. Because of the taxonomic uncertainty, I consider this record of *Apheloria* as *virginiensis*.

Shelley (1990) provided a range map for the Xystodesmid tribe Chonaphini which shows *Semionellus placidus* ranging from southwestern Minnesota through central and eastern Wisconsin. The specific collection information that served as the basis of the map was not provided. However, Shelley did state that he had "seen specimens from Wisconsin."

In his revision of *Euryurus*, the most recent work on the genus, Hoffman (1978) cited no records of *E. leachii* from Wisconsin. Material from Wisconsin has not been found in any museum collection, casting doubt on general records from Wisconsin (e.g., Chamberlin & Hoffman 1958 and Keevan 1983; Shelley, pers. comm.). The nearest records are from southern Illinois and central Indiana (Hoffman 1978).

Populations of the tropical *Oxidus gracilis* may not be established in the state in natural habitats. The species is most commonly known from greenhouses (Causey 1943), and Blower (1985) pointed out the unlikelihood of it surviving temperate winters. One of the only two Wisconsin records of *O. gracilis* is from potting soil.

The order Julida also appears to be widely distributed in the state (Fig. 2), with eight species occurring in 11 counties. The introduced *Cylindroiulus caeruleocinctus* is the most frequently collected julid. This species prefers calcareous soils (Blower 1985); as a result, its distribution may be restricted primarily to the eastern parts of the state.

The order Polyzoniida is the least well known order in the state. Two collections have been made, only one of which is identifiable as *Polyzonium mutabile*. The orders Callipodida and Chordeumatida are also poorly known with only one and four species, respectively, occurring in the state.

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